Stroke after varicose vein foam injection sclerotherapy

Martin V. Forlee, FCS(SA), Maria Grouden, MSc, Dermot J. Moore, MD, and Gregor Shanik, MD,
Dublin, Ireland

This report describes an ischemic stroke after foam injection sclerotherapy of varicose veins in a patient with a patent foramen ovale. Foam injection sclerotherapy has created resurgence in the minimally invasive treatment of varicose veins. The United States Food and Drug Administration halted a clinical phase 2 trial of a commercial preparation of polidocanol microfoam in 2003 because of concerns relating to possible gas embolism. These trials were recommenced in July 2005. Neurologic complications such as transient visual disturbances and transient confusional states have previously been reported. This case, with its strong circumstantial evidence, illustrates the previously unconfirmed potential for embolic complications using this technique. (J Vasc Surg 2006;43:162-4.)

Foam injection sclerotherapy has created resurgence in the minimally invasive treatment of varicose veins. The United States Food and Drug Administration halted a clinical phase 2 trial of a commercial preparation of polidocanol microfoam in 2003 because of concerns relating to possible gas embolism. These trials were recommenced in July 2005. This report describes an ischemic stroke after foam injection sclerotherapy for the treatment of varicose veins in a patient with a patent foramen ovale.

CASE REPORT

In February 2005, a 61-year-old man presenting with symptomatic CEAP clinical class IV varicose veins (Fig 1) developed a right hemiparesis shortly after foam injection sclerotherapy of the right great saphenous vein (GSV). A preprocedure duplex scan had demonstrated gross saphenofemoral junction and GSV incompetence. The short saphenous system and the deep veins were normal.

The GSV was cannulated directly by using ultrasound guidance. Polidocanol foam (0.5%) was produced with a double syringe and a three-way tap (Tessari method), and 20 mL was injected into the vein while the saphenofemoral junction was compressed. The peripheral varicosities were compressed with cotton wool balls and adhesive plaster, and an elastic compression bandage was applied with the leg elevated.

While getting dressed, the patient suddenly developed right upper-limb weakness associated with a frontal headache and sweating. His medical history included poorly controlled type I diabetes mellitus, hypertension, hypercholesterolemia, asthma, and also migraine without aura. His medication included a basal bolus regime of subcutaneous insulin injection, a diuretic, and a salbutamol (albuterol) inhaler.

From the Department of Vascular and Endovascular Surgery, St James Hospital.

Competition of interest: none.

Reprint requests: Dr Martin Forlee, St James Hospital, Department of Vascular and Endovascular Surgery, James Street, Dublin, County Dublin 8, Ireland (e-mail: mvforlee@eircom.net).

0741-5214/$32.00

doi:10.1016/j.jvs.2005.09.032

A neurologic examination revealed a mild expressive aphasia and a right hemiparesis (right arm, 1/5; right leg, 4/5). The cranial nerves were intact. He had evidence of a peripheral neuropathy, with decreased vibration sense of the lower limbs bilaterally. He scored 7/42 on the National Institutes of Health Stroke Severity scale. The power in the right upper limb improved to 4/5 over a period of 10 minutes, and his speech returned to normal.

A carotid duplex scan, performed immediately, showed normal arteries with rapidly moving echogenic particles within the left carotid lumen. This was similar to the duplex appearance of foam in the GSV. A magnetic resonance image of the brain was normal. His baseline blood glucose, serum electrolytes, full blood count, coagulation studies, and chest radiograph were normal. The electrocardiogram showed sinus rhythm, and a 24-hour Holter monitor did not reveal any paroxysmal arrhythmias. His transesophageal echocardiogram revealed an 18-mm patent foramen ovale with an associated atrial septal aneurysm. A right-to-left shunt was demonstrated with a color flow duplex scan and the bubble test (Fig 2). The cardiac valves were normal, and he had grade II atheroma of the distal arch of his aorta.

Over the course of 2 weeks, the power in the right upper limb returned to normal, although fine motor coordination remained mildly impaired. A follow-up duplex scan showed that the GSV was occluded up to the saphenofemoral junction, with normal deep veins. Peripheral varicosities below the knee were still patent. A repeat carotid duplex ultrasound scan was normal. The patient has been referred to the cardiac service and awaits percutaneous transcatheter closure of his patent foramen ovale. Patient consent was obtained for this case report.

DISCUSSION

The efficacy and safety of foam injection sclerotherapy as a minimally invasive treatment for varicose veins has been documented in large case series[1,3,4] and a single randomized controlled trial.[5] Neurologic complications including transient visual disturbance and transient confusional state have been described but are uncommon.[2] In a series of 453 patients, seven events were reported, but the incidence depended on the method of foam production.[1] Another series involving 2500 patients reported four cases of transient scotomata with or without migraine.[3] A case report

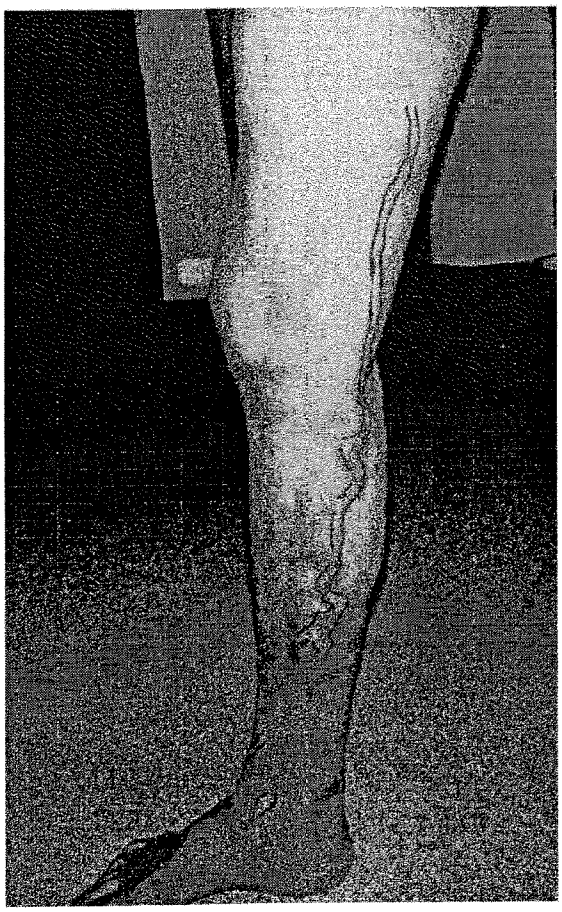

Fig 1. Right leg shows marked stigmata of venous hypertension.

has been published documenting a stroke in a patient with a patent foramen ovale, but this occurred 3 days after variceal sclerotherapy and the association is tenuous at best.[7] Pulmonary symptoms such as coughing have also been reported.

A patent foramen ovale persists when fusion of the septum primum and septum secundum is inadequate and occurs in up to 27% of the population.[8] Patent foramen ovale has been implicated in patients with cryptogenic embolic ischemic stroke, type II decompression sickness, and is associated with migraine with aura. Risk factors for paradoxical embolism include a large patent foramen ovale opening, an associated atrial septal aneurysm, a large right-to-left-shunt and a right-to-left-shunt at rest.[8]

The optimal volume of foam to treat truncal varices remains controversial. A recent European consensus statement recommended 6 to 8 mL per session, but different published reports have used from 3 mL up to 30 mL.[6] An air embolism can be fatal when a volume of >1 ml/kg is entrained into the venous system but can cause problems with as little as 50 mL. Larger volumes of foam are associated with a higher incidence of deep vein thrombosis. Although there is no evidence that a lower volume is safer in a patient with a PFO, we have changed our practice and limit the volume administered to <10 mL of foam.

In the absence of any other obvious source, it has to be assumed that the stroke resulted from paradoxical embolism of foam through the patent foramen ovale. The temporal relationship of the incident and the presence of foam in the carotid on duplex lend further support to this. The resulting ischemia may have been caused by the air embolism or due to spasm induced by the chemical.

Embolic complications have not been reported with other nonoperative modalities like endovenous laser (EVLT) and radiofrequency ablation (VNUS) (VNUS Medical Technologies, San Jose, Calif). EVLT and VNUS

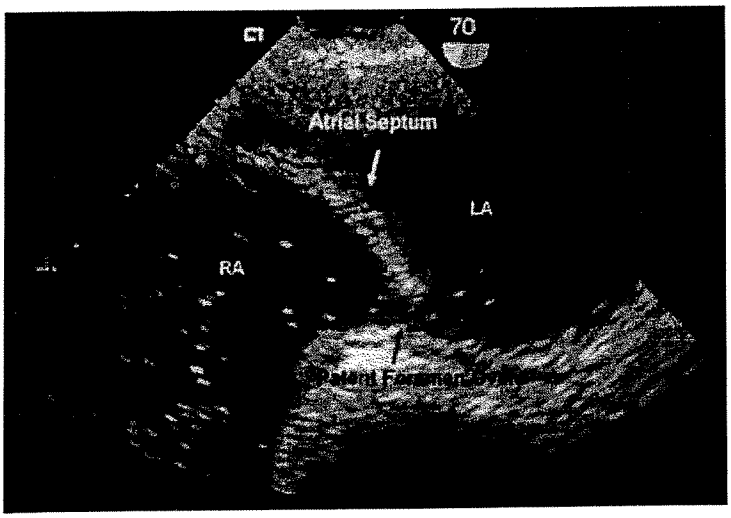

Fig 2. Bubble test. Transesophageal echocardiogram shows bubbles passing from right atrium to left atrium through patent foramen ovale *(arrow)*. *RA*, Right atrium; *LA*, left atrium.

have a high GSV closure rate of 94% to 99% and 81% to 100%, respectively.[10] Complication rates are lower than with open surgery, although one study did suggest a higher rate of deep vein thrombosis with radiofrequency ablation.[11]

CONCLUSION

This case illustrates a major, potentially fatal complication of treatment for a benign condition. It raises the issue of whether all patients should be screened with transesophageal echocardiography before treatment. This is clearly not feasible. Failure to do so, however, could result in severe medicolegal consequences. Extreme caution should be exercised in patients with a known patent foramen ovale. Further studies are required to determine the optimal volume of foam that can be safely used.[9]

REFERENCES

1. Frullini A, Cavezzi A. Sclerosing foam in the treatment of varicose veins and telangiectases: history and analysis of safety and complications. Dermatol Surg 2002;28:11-5.
2. Guex JJ, Allaert FA, Gillet JL, Chleir F. Immediate and midterm complications of sclerotherapy: report of a prospective multicenter registry of 12,173 sclerotherapy sessions. Dermatol Surg 2005;31: 123-8; discussion 128.
3. Barrett JM, Allen B, Ockelford A, Goldman MP. Microfoam ultrasound-guided sclerotherapy of varicose veins in 100 legs. Dermatol Surg 2004;30:6-12.
4. Yamaki T, Nozaki M, Iwasaka S. Comparative study of duplex-guided foam sclerotherapy and duplex-guided liquid sclerotherapy for the treatment of superficial venous insufficiency. Dermatol Surg 2004;30: 718-22.
5. Hamel-Desnos C, Desnos P, Wollman JC, Ouvry P, Mako S, Allaert FA. Evaluation of the efficacy of polidocanol in the form of foam compared with liquid form in sclerotherapy of the greater saphenous vein: initial results. Dermatol Surg 2003;29:1170.
6. Breu FX, Guggenbichler S. European consensus meeting on foam sclerotherapy, April, 4-6,2003, Tegernsee, Germany. Dermatol Surg 2004;30:709-17.
7. Hanisch F, Muller T, Krivokuca M, Winterholler M. Stroke following variceal sclerotherapy. Eur J Med Res 2004;9:282-4.
8. Horton SC, Bunch TJ. Patent foramen ovale and stroke. Mayo Clin Proc 2004;79:79-88.
9. Landzberg MJ, Khairy P. Indications for the closure of patent foramen ovale. Heart 2004;90:219-24.
10. Beale RJ, Gough MJ. Treatment of primary varicose veins: a review. Eur J Vasc Endovasc Surg 2005;30:83-95.
11. Hingorani A, Ascher E, Markevich N, Schutzer RW, Kallakuri S, Hou A, et al. Deep venous thrombosis after radiofrequency ablation of greater saphenous vein: a word of caution. J Vasc Surg 2004;40:500-4.

Submitted Jul 11, 2005; accepted Sep 26, 2005.